

## ORIGINAL RESEARCH

PRE-OPERATIVE LOW BACK PAIN NEGATIVELY AFFECTS  
SELF-REPORTED FUNCTION IN INDIVIDUALS  
UNDERGOING HIP ARTHROSCOPYLindsay C. Becker, PT, DPT, SCS, CSCS<sup>1</sup>Stephanie Carter-Kelley, PT, PhD, OCS<sup>2</sup>Thomas Ellis, MD<sup>3</sup>Kathleen Cenkus, MPH<sup>4</sup>Stephanie L. Di Stasi, PT, PhD, OCS<sup>2,5</sup>

## ABSTRACT

**Background/Purpose:** Low back pain (LBP) is a common source of disability in adults and highly prevalent in patients with painful hip pathology. Persistent LBP after hip arthroplasty is associated with lower self-reported function, however, the effect of pre-operative LBP in patients undergoing hip arthroscopy for FAI has not been evaluated. The purpose of this study was to determine whether improvements in self-reported hip function following arthroscopic surgery for femoroacetabular impingement (FAI) differed between those with and without reports of pre-operative low back pain.

**Study Design:** Cohort

**Methods:** Three hundred eighteen subjects undergoing primary hip arthroscopy for clinically and radiographically-confirmed FAI were recruited and consented. One hundred fifty-six of these subjects completed the International Hip Outcomes Tool (iHOT-33) and the Hip Outcome Score Activities of Daily Living Subscale (HOS-ADL) before, and six and 12 months after surgery. Subjects were grouped based on the self-reported presence or absence of LBP prior to arthroscopy. A repeated measures analysis of variance was used to determine the effects of time and low back pain on iHOT-33 and HOS-ADL scores.

**Results:** Seventy-five of 156 subjects (48.1%) reported LBP prior to surgery. A main effect of time was found for both outcome measures ( $p < 0.001$ ), demonstrating improvement in self-reported outcomes over the testing period. There was a main effect of group for the iHOT-33 (LBP: 52.0 [47.9,56.0]; no LBP 57.9 [53.9,61.8];  $p = 0.043$ ) but not for the HOS-ADL (LBP: 75.2 [72.2,78.2]; no LBP 78.8 [75.9,81.7];  $p = 0.088$ ) indicating that subjects with pre-operative LBP had poorer self-reported function per the iHOT-33 compared to those without LBP.

**Conclusion:** Self-reported hip function scores improved regardless of the presence of pre-operative LBP; however subjects with LBP reported poorer self-reported function per the iHOT-33 as compared to those without LBP up to 12 months post-operatively.

**Level of Evidence:** 3c

**Key Words:** Femoroacetabular impingement, low back pain, outcomes

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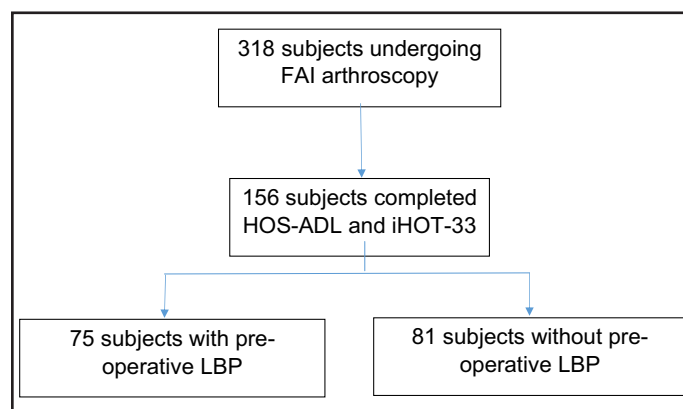
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## INTRODUCTION

Low back pain (LBP) is a common source of disability in adults and is present in up to fifty percent of patients with painful hip pathology.<sup>1,2</sup> LBP is strongly associated with the presence of radiographic hip osteoarthritis (OA) in patients who report hip pain,<sup>3</sup> and is a significant predictor of higher osteoarthritic pain and disability scores within five years of baseline measures.<sup>4</sup> Hip arthroplasty appears to have a positive effect on LBP and self-reported function post-operatively,<sup>5</sup> however, persistent LBP following total hip arthroplasty is associated with lower self-reported hip function and quality of life.<sup>2</sup>

Femoroacetabular impingement (FAI) is an abnormality in femoral and/or acetabular morphology which can cause hip pain in young and active adults<sup>6,7</sup> and may be a precursor to joint osteoarthritis.<sup>8</sup> While groin pain is the main symptomatic complaint of these patients, many have pain in adjacent regions.<sup>9,10</sup> One in four patients presenting with hip FAI report concomitant LBP and have often been diagnosed and treated for lower back pain prior to obtaining a diagnosis of FAI.<sup>9,11</sup> The presence of LBP in those individuals with FAI may negatively affect post-operative disability and resolution of prior level of function, thereby potentially necessitating targeted low back rehabilitation pre-operatively and/or post-operatively in addition to the management of FAI. The purpose of this study was to determine whether improvements in self-reported hip function following arthroscopic surgery for FAI differs between those with and without complaints of pre-operative LBP. The primary hypothesis tested was that patients with pre-operative LBP would report lower self-reported function both before and up to one year after hip arthroscopy.



**Figure 1.** *Subject Recruitment Process*

Subjects were recruited from the Hip Preservation Division at The Ohio State University Wexner Medical Center. Subjects who completed outcome measures at all time points were included in the data set and grouped by presence or absence of self-reported pre-operative LBP.

## METHODS

Three hundred eighteen subjects undergoing hip arthroscopy for FAI were recruited from the Hip Preservation Division at The Ohio State University Wexner Medical Center. [Figure 1] Those subjects requiring revision surgery or bilateral hip arthroscopies were excluded. Subjects had to be at least 15 years of age, and surgical eligibility was determined by the presence of all clinical and radiographic guidelines listed in Table 1. Subjects were excluded from the study if they did not provide informed consent or required other hip surgeries, including but not limited to labral repair without osteoplasty/acetabuloplasty, periacetabular osteotomy, labral reconstruction, or gluteus medius repair. The study was approved by the Ohio State University Institutional Review Board, and all subjects provided written and informed consent.

**Table 1.** *Eligibility criteria for FAI arthroscopy*

Surgical eligibility for FAI arthroscopy was determined by the criteria listed above

1. Clinical presentation consistent with FAI which adversely affected patient function
2. Alpha angle >50 degrees for CAM impingement; presence of acetabular retroversion and/or coxa profunda for pincer impingement
3. Failed conservative therapy, minimum of ~4 weeks
4. Hip pain relieved after injection with a local anesthetic
5. Minimal degenerative hip changes (Tonnis grade ≤ 1)
<i>Subjects meeting all listed criteria were considered eligible for FAI arthroscopy</i>

**Table 2.** Mean scores (with 95% confidence intervals) for the International Hip Outcome Tool (iHOT-33) and the Hip Outcome Score Activities of Daily Living (HOS-ADL)  
A main effect of group was found for iHOT-33 indicating those with pre-operative LBP had poorer self-reported outcomes than those without LBP

	iHOT-33	p-value
LBP	52.0 (47.9, 56.0)	0.043*
No LBP	57.9 (53.9, 61.8)	
	HOS-ADL	
LBP	75.2 (72.2, 78.2)	0.088
No LBP	78.8 (75.9, 81.7)	
LBP= low back pain * p <0.05		

One hundred fifty-six of the enrolled 318 subjects (Age 31.2 years  $\pm$  15.4 ,BMI 24.8  $\pm$  3.8, 39 Males/117 Females) had complete data sets at the time of the data analyses. The International Hip Outcomes Tool (iHOT-33)<sup>12</sup> and the Hip Outcome Score Activities of Daily Living Subscale (HOS-ADL)<sup>13</sup> were completed before surgery, and at 6 and 12 months after surgery to assess self-reported hip function. The iHOT-33 is a 33-item patient self-report outcome measure with questions regarding symptoms and functional limitations; sports and recreational activities; job-related concerns; and social, emotional, and lifestyle concerns. The iHOT-33 is scored from 0-100 with 100 representing the best quality of life and has a minimal clinically important difference (MCID) of 6.1 points and a test/re-test reliability interclass correlation coefficient (ICC) of 0.78.<sup>12</sup> The HOS-ADL contains 19 items pertaining to basic daily activities and is scored as a percentage with 100% representing the highest level of physical function. The HOS-ADL has a MCID of 9 points and a test/retest reliability of 0.98. Subjects also completed a body chart where they were asked to indicate the area(s) in which they were currently experiencing pain.<sup>13</sup> The subjects were then grouped based on the self-reported presence or absence of LBP prior to arthroscopy.

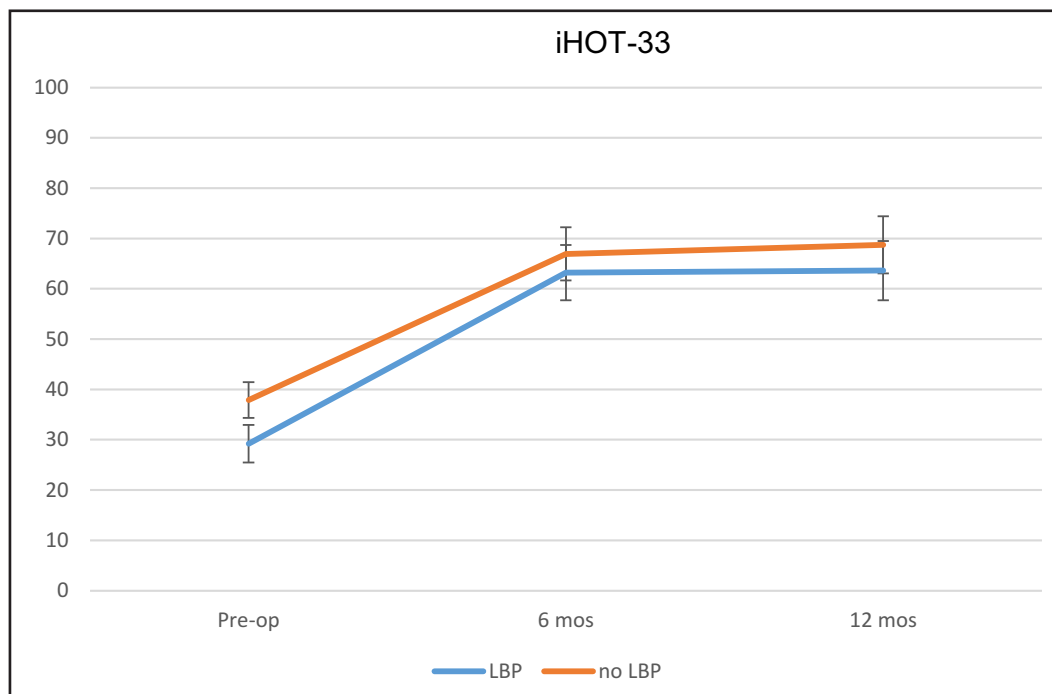
A multivariate repeated measures analysis of variance was used to determine the effects of time and LBP on iHOT-33 and HOS-ADL scores. (SPSS, Inc. Version 22, Chicago, IL) Where significant interactions were

identified, post-hoc t-tests were used to determine where group or time differences existed ( $p \leq 0.05$ ). Main effects of time and group were also evaluated and data are reported as means and 95% confidence intervals.

## RESULTS

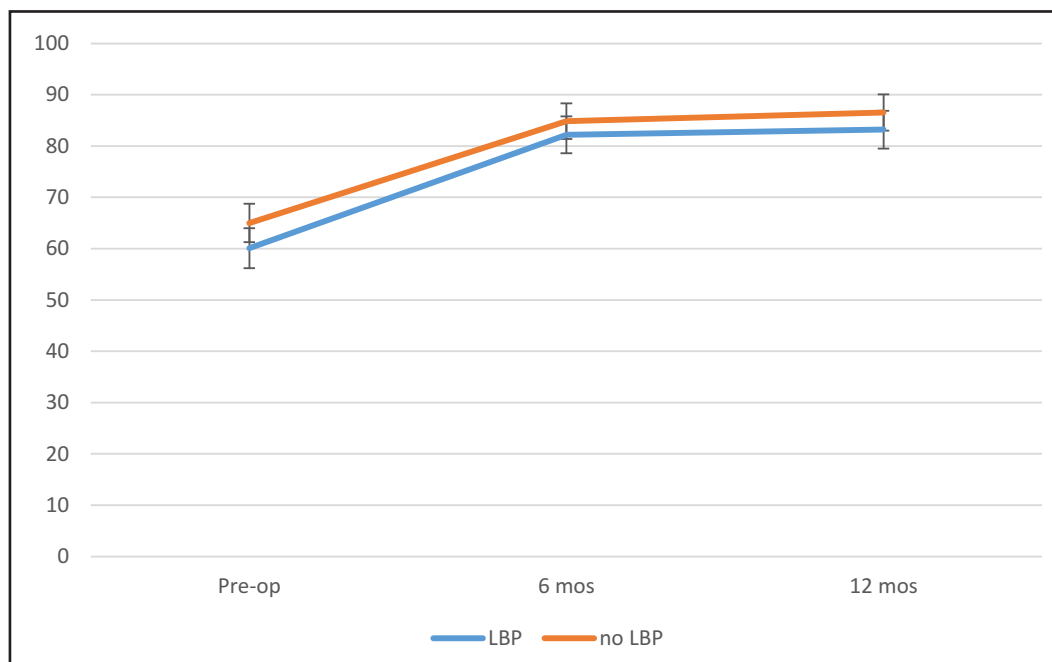
Seventy-five of 156 subjects (48.1%) reported LBP prior to surgery. Groups did not differ based on age, BMI, or sex distribution ( $p \geq 0.24$ ). No significant group x time interaction was identified for either the iHOT-33 ( $p \geq 0.41$ ) or the HOS-ADL ( $p \geq 0.37$ ). A main effect of time was found for both outcome measures ( $p < 0.001$ ) demonstrating improvement in self-reported outcomes over the testing period regardless of group. There was a main effect of group [Table 2] for the iHOT-33 (LBP: 52.0 [47.9,56.0]; no LBP 57.9 [53.9,61.8];  $p = 0.04$ ) [Figure 2] indicating that subjects with LBP had poorer self-reported function (lower iHOT-33 scores) compared to those without LBP; there was no statistically significant main effect of group for the HOS-ADL (LBP: 75.2 [72.2,78.2]; no LBP 78.8 [75.9,81.7];  $p = 0.09$ ) [Figure 3].

To further explore whether changes were clinically important, the percentage of subjects achieving the minimal clinically important difference (MCID) was calculated. The MCIDs for the HOS-ADL and iHOT-33 are 9 and 6.1, respectively.<sup>12,13</sup> At six months post-operatively, 39.7% of those subjects with LBP achieved MCID per the HOS-ADL compared to 34.6% of those without LBP. At the six month



**Figure 2.** *iHOT-33 scores in subjects with and without LBP*

iHOT-33 scores in those with LBP (blue) and without LBP (red) at pre-op, 6 months, and 12 months post-op. 95% confidence intervals are shown.



**Figure 3.** *HOS-ADL scores in subjects with and without LBP*

HOS-ADL scores in those with LBP (blue) and without LBP (red) at pre-op, 6 months and 12 months post-op. 95% confidence intervals are shown.

post-operative assessment, 44.2% of subjects with LBP achieved MCID per the iHOT-33 compared to 41.0% of those without LBP. At one year post-operatively, 39.1% of subjects with LBP achieved MCID

compared to pre-operative scores per the HOS-ADL and 41% of those without LBP achieved MCID. Per the iHOT-33, 42.9% of subjects with LBP achieved MCID at one year compared to 43.6% without LBP.

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## DISCUSSION

The purpose of this study was to determine whether the self-reported recovery of function following arthroscopic surgery for FAI differs between those with and without complaints of pre-operative LBP. All subjects who underwent hip arthroscopy for symptomatic FAI demonstrated significant improvement in self-reported hip function, regardless of the presence of pre-operative LBP. However, those subjects with pre-operative LBP reported poorer self-reported function per the iHOT-33 as compared to those without LBP both before and up to 12 months after hip arthroscopy.

The function of the lumbar spine, pelvis, and hips are inextricably linked by their common anatomy, which likely explains the high prevalence of LBP in patients seeking medical care for hip pain.<sup>2,4</sup> Data from the current study indicate that while both patients with and without LBP have improved self-reported function after arthroscopic surgery for FAI, scores for those with pre-operative LBP are lower at 12 months post-op. Corrective surgery appears to have a positive effect on pre-operative low back pain in patients undergoing THA. Ben-Galim et al.<sup>5</sup> reported improved spinal pain and function at three months post-THA and improved hip function correlated with improved spinal function up to two years after surgery. Parvizi et al.<sup>2</sup> reported that of the 170 patients with LBP prior to THA, 66% had complete resolution of LBP symptoms post-operatively. Additionally, Parvizi found that patients who did not have LBP after THA had higher mean Harris hip and SF-36 scores than patients who experienced LBP after THA.<sup>2</sup> While many patients with hip pain experience relief of LBP following THA, the best course of treatment to address residual LBP and disability following hip arthroscopy is still unknown.

In this study, self-reported hip function was significantly lower in the subjects with LBP, but this relationship was only noted for the iHOT-33 scores. While both the iHOT-33 and HOS-ADL are commonly used to assess self-reported function in those with hip disorders, the HOS-ADL exclusively measures the patient's perception of physical function during common daily tasks. In contrast, the iHOT-33 also contains questions regarding the patient's emotional, social, and lifestyle dimensions and was

developed for physically active individuals.<sup>12</sup> The HOS-ADL has also been shown to have a ceiling effect, especially at 12 months post arthroscopy.<sup>14</sup> The iHOT-33 seemed to better capture self-reported disability in the present subject population than the HOS-ADL, and may be considered for mid- and long-term outcome studies in patients with FAI.

Although subjects with LBP reported poorer hip function than those without LBP, it is interesting to note that the majority of subjects in either group did not achieve MCID improvements at six or 12 months post-operatively. These data indicate that while patients may report improved hip function after surgery, they do not achieve full, unrestricted function within the first year. Future research to determine which patients would most benefit from surgical intervention as well as identifying additional complicating factors may help to improve outcomes in this population.

This study has several limitations. The study included only the self-reported presence or absence of LBP prior to surgery. Severity and location of LBP and/or back-related disability were not recorded either pre- or post-operatively in this study. The use of a low back-specific outcome tool such as the Modified Oswestry Low Back Questionnaire<sup>15</sup> or a Visual Analog Scale at each time point may have provided additional insight into the relationship between hip function and LBP. Additionally, only subjects with full data sets up to one year post-arthroscopy were included in the analysis. Excluding subjects who dropped out of the study, or did not yet reach the six month or one-year post-operative time point does limit the generalizability of the current findings. Those with poorer outcomes may have been more likely to continue follow-up, thus explaining the high percentage of those with LBP in this study (48.1%) compared to 23% in a previous study by Clohisy et al.<sup>9</sup> This potentially skewed population may also explain why neither group achieved MCID on outcomes measures at either post-operative time point. Another limitation of this study is the lack of clinical objective measures to correlate with self-reported outcome measures. For example, hip range of motion measured pre- and post-operatively may determine whether range of motion had an effect on self-reported function in this population. A hallmark of FAI is the loss of internal rotation range of motion



of the symptomatic hip,<sup>9,10,16</sup> and deficits and/or asymmetry in hip internal rotation have shown to be associated with LBP.<sup>17-20</sup> Those subjects with LBP may have had more severe loss of internal rotation mobility thus negatively affecting their function compared to those without LBP. Inclusion of objective physical measurements as well as patient-reported outcome tools would improve understanding of how hip and LBP and disability are related in this population.

## CONCLUSION

Subjects who underwent hip arthroscopy for symptomatic FAI demonstrated improved self-reported hip function, regardless of the presence of pre-operative LBP. Those subjects with pre-operative LBP reported poorer self-reported function on the IHOT-33 as compared to those without LBP up to 12 months post-operatively. Future analyses may support the use of the iHOT-33 in identifying how low back pain influences functional outcomes following hip arthroscopy.

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